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10/531,931	04/19/2005	Gerard De Haan	NL 021030	5660

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EXAMINER	
TORRES, JOSE	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No.	Applicant(s)	
	10/531,931	DE HAAN ET AL.	
	Examiner	**Art Unit**	
	JOSE M. TORRES	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 24 September 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,2 and 4-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 15,16 and 19-21 is/are allowed.

6)☒ Claim(s) 1,2 and 4-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The Amendment – After Non-Final Rejection has been entered and made of record.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (U.S. Pat. No. 7,042,512) in view of Demos (U.S. Pat. No. 6,442,203) and Borer et al. (U.S. Pat. No. 5,784,114).

As to claims 1 and 13, Yang et al. teaches an image processing unit/method for computing a sequence of output images on basis of a sequence of input images, comprising: - a motion estimation unit (FIG. 4, "*Motion Estimation Unit **410***") for computing a motion vector field (FIG. 6A, "*motion vectors of a video image*") on basis of the input images ("*(n-1)-th and (n+1)-th fields*"), the motion vector field comprising a first motion vector belonging to a first group of pixels and a second motion vector belonging to a second group of pixels (Col. 3 line 58 through Col. 4 line 8 and line 54 through Col. 5 line 6); - a quality measurement unit (FIG. 4, "*Motion Estimation Unit **410***") for

computing a value of a quality measure for the motion vector field ("*accuracy of each motion vector in the field to be interpolated*", Col. 3 line 62 through Col. 4 line 8); - an interpolation unit (FIG. 4, "*Motion Compensated Interpolation Unit **440** and Spatio-Temporal Interpolation Unit **450***") for computing a first one of the output images by means of interpolation of pixel values of the input images, the interpolation being based on the motion vector field (Col. 4 lines 22-30), and - control means to control the interpolation unit (FIG. 4, "*Adaptive Selection Unit **460***") on basis of the quality measure ("*motion type*" and "*accuracy*", Col. 4 lines 31-41 and Col. 5 lines 59-67).

However, Yang et al. fails to teach the interpolation unit is arranged to perform a motion compensated interpolation of the pixel values of the input images on basis of the motion vector field, if the value of the quality measure is lower than a predetermined threshold and is arranged to perform an alternative interpolation of the pixel values of the input images, if the value of the quality measure is higher than the predetermined threshold, the interpolation unit mixes intermediate images from the motion compensated interpolation and from the alternative interpolation, the quality measurement unit is arranged to compute the value of the quality measure on basis of a maximum difference between the first motion vector and the second motion vector, and the motion estimation unit, the quality measurement unit, the interpolation unit, and the control means are implemented using a processor.

Demos teaches the interpolation unit ("*at least one processor*") is arranged to perform a motion compensated interpolation ("*"motion-compensated" image*") of the pixel values of the input images on basis of the motion vector field (Col. 14 lines 34-44),

if the value of the quality measure ("*confidence measures and factor*") is lower than a predetermined threshold ("*threshold*") and is arranged to perform an alternative interpolation ("*a fall back value*") of the pixel values of the input images, if the value of the quality measure is higher than the predetermined threshold, the quality measurement unit is arranged to compute the value of the quality measure on basis of a maximum difference between the first motion vector and the second motion vector (Col. 17 line 53 through Col. 18 line 14 and Col. 21 lines 36-42), and the motion estimation unit, the quality measurement unit, the interpolation unit, and the control means are implemented using a processor (Col. 23 lines 27-62).

Borer et al. teaches the interpolation unit (FIG. 5, "*Multiplier* ***36***") mixes intermediate images from the motion compensated interpolation and from the alternative interpolation ("*If confidence output of the store is low then an appropriate fraction of the output is mixed with the input field. That is the system gradually falls back to state in which motion compensation is not used.*", Col. 5 line 63 through Col. 6 line 17).

Therefore, in view of Demos and Borer et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yang et al. by incorporating at least one processor for performing motion-compensated or an alternative interpolation based on the behavior of the confidence measure and factor of the motion vectors and mixing intermediate images from the motion-compensated and alternative interpolation based on a confidence output in order to preserve the temporal clarity of high amplitude details in interlace images, while reducing overall picture

interlace artifacts (Demos' Col. 17 line 27 through Col. 18 line 14) and properly care when dealing with regions of revealed or obscured background of the image (Borer et al.'s Col. 2 line 57 through Col. 3 line 8).

As to claim 2, Yang et al. teaches the first group of pixels is a neighboring group of pixels of the second group of pixels (As depicted in at least Figure 6A, the vectors shown belongs to neighboring groups. Col. 4 line 56 through Col. 5 line 6).

As to claim 4, Demos teach the alternative interpolation comprises a non-motion compensated interpolation ("*a fall back value*", Col. 21 lines 36-51).

As to claim 5, Demos teaches the alternative interpolation comprises a replication of the pixel values of the input images ("*default values*", Col. 21 lines 36-51.

As to claim 6, Demos teaches the quality measurement unit is arranged to compute the value of the quality measure on basis of a maximum difference between the horizontal component of the first motion vector and the horizontal component of the second motion vector (Since the local gradient of the motion vector picture indicates motion, and the motion picture image is an RGB image with the R component representing an X coordinate of a motion vector, the G component representing the Y component of a motion vector and the B component for the confidence factor, the

difference between the horizontal components is performed, see Col. 7 line 55 through Col. 8 line 27 and Col. 17 line 53 through Col. 18 line 14).

As to claim 7, Yang et al. teaches the first group of pixels is located horizontally from the second group of pixels (Similar to claim 2 above, and s depicted in at least Figure 6A, the groups are located horizontally among each other. Col. 4 line 56 through Col. 5 line 6).

As to claim 8, Demos teaches the predetermined threshold is an adaptive threshold ("*pixel thresholds based upon knowledge of the type of images*", Col. 17 lines 27-53).

As to claim 9, Demos teaches the adaptive threshold is based on match errors ("*empirically determined*") being computed for the first and second motion vectors (Col. 17 lines 37-52).

As to claim 10, Demos teaches an image processing apparatus ("*programmable system*") comprising: - receiving means ("*one input device*") for receiving a signal ("*input data*") corresponding to a sequence of input images; and - an image processing unit ("*processor*") for computing a sequence of output images on basis of the sequence of input images, as claimed in claim 1 (Col. 23 lines 27-62).

As to claim 11, Demos teaches an image processing apparatus as claimed in claim 10, characterized in further comprising a display device for displaying the output images ("*The output information is applied to one or more output devices, in known fashion*", Col. 23 lines 27-62. It is to be understood that an output device may be a high-definition television as described in Yang et al.).

As to claim 12, Demos teaches an image processing apparatus as claimed in claim 11, characterized in that it is a TV ("*output device*").

As to claim 14, Demos teaches the value of the adaptive threshold is relatively high when the match errors being computed for the first and second motion vectors are relatively low (The confidence measure break down considers the case when the matches are poor and since the threshold is empirically derived, as with any optimization algorithm, minimizing the error is one goal, see Col. 8 lines 27-41, Col. 15 line 65 through Col. 16 line 11 and Col. 17 lines 37-52).

As to claim 17, Yang et al. teaches a motion compensated interpolator (FIG. 4, "*Motion Compensated Interpolation Unit **440***") to perform the motion compensated interpolation of the pixel values of the input images on basis of the motion vector field, and a non-motion compensated interpolator (FIG. 4, "*Spatio-Temporal Interpolation Unit **450***") to perform the alternative interpolation of the pixel values of the input images.

Borer et al. teaches two multipliers (FIG. 7, "*Lookup Tables **34** and **38** and Multiplier **36***") that are controlled by a control means (FIG. 7, "*Motion Vector Processing Unit **28***"), and an adding unit (As stated in at least Col. 5 line 63 through Col. 6 line 21, "*the system gradually falls back to state in which motion compensation is not used. The proportion of the basic motion compensated and input fields in the final output are controlled by the lookup table driven by the confidence signal*").

As to claim 18, Borer et al. teaches a control means modifies the motion vector field from the motion estimation unit ("*The motion vectors are scaled according to the position of the output field relative to the input field.*"), wherein the interpolation unit computes the first one of the output images by means of interpolation of the pixel values of the input images based on the modified motion vector field (Col. 6 lines 22-63).

Allowable Subject Matter

4. Claims 15, 16 and 19-21 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the closest prior art made of record fails to teach or suggest an image processing unit for computing a sequence of output images on basis of a sequence of input images, comprising: - a motion estimation unit for computing a motion vector field on basis of the input images, the motion vector field comprising motion vectors, wherein each of the motion vectors belongs to a group of pixels; - a quality measurement unit for computing a value of a quality measure for the motion vector field; - an interpolation unit

for computing a first one of the output images by means of interpolation of pixel values of the input images, the interpolation being based on the motion vector field; and - control means to control the interpolation unit on basis of the quality measure, characterized in that the quality measurement unit is arranged to compute the value of the quality measure on basis of the maximum of the differences between the motion vectors, wherein the motion estimation unit, the quality measurement unit, the interpolation unit, and the control means are implemented using a processor.

Response to Arguments

Claim Rejections under 35 U.S.C. § 103

5. With respect to claims 1, 2 and 4-14, Applicant's arguments have been considered but are moot in view of the new grounds of rejection.

With respect to claims 15 and 16, Applicant's arguments have been fully considered and are persuasive. Therefore, the rejections have been withdrawn.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Thomson disclose Problems of Estimation and Measurement of Motion in Television, Borer '621 disclose a Motion Compensated Interpolation, and Borer '202 disclose a Motion Vector Field Error Estimation.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSE M. TORRES whose telephone number is (571)270-1356. The examiner can normally be reached on M-F: 10:00am-6:00pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571)272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Supervisory Patent Examiner, Art Unit 2624

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